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THE COCONUT BUD-ROT IN PORTO RICO.

By C. M. Tucker.

Throughout most of the coconut producing lands of the world the most serious disease attacking the trees is the bud-rot. In different countries the disease assumes varied symptoms and is caused by different organisms, bacteria or fungi. The bud-rot has caused serious losses in the Philippine Islands, India, Malabar, Ceylon, Cuba, Trinidad, Jamaica and other countries. One of the most severe outbreaks occurred in Cuba, where the disease was studied and ascribed to bacteria.

In Porto Rico the coconut palm has been comparatively free from serious diseases. In 1912, G. L. Fawcett, plant pathologist at this station, studied some isolated cases of bud-rot. In the section where he found a few diseased palms the disease has now spread until twenty-five per cent of the trees have died.

A survey has recently been made along the western coast between Mayaguez and the Rincon point to determine the incidence and severity of the disease. About 600 diseased trees have been found. The most badly affected regions appear to be along the beach at Mayaguez and on a farm north of the Añasco River. In each case about 25 per cent of the trees have been killed. In the Mayaguez section the disease seems to have appeared about 1911 and to have spread rather slowly, while in the farm near the Añasco River it is said to have been first seen in 1918 and to have spread rapidly in 1922 and 1923. The number of diseased trees as shown by the survey is not a true index of the damage the disease has done, as no attempt was made to determine the cause of the death of numerous trees which had been cut down, most of which probably died from bud-rot.

The first visible symptom of the disease is the yellowish brown color of the young emerging leaf. The color is a light, bleached brown, as might be expected following the death of a leaf in which the chlorophyll, or green coloring matter is not yet developed. A section through the bud at this stage shows the young leaf bases and the growing point to be involved in a soft, watery, ill-smelling rot. The young swords are rotted in the same manner. The dead leaf may be pulled out of the inclosing leaf sheaths. If the diseased palm is allowed to stand the leaf is soon broken by the wind and hangs tip downward between the older leaves, finally breaking off and falling to the ground. The older leaves may remain green and retain their normal position for several months. As the older leaves fall and no new ones emerge the tree soon has a crown of horizontal leaves which gradually fall away leaving the bare trunk.

The infection does not extend to the nuts, and those which have reached a diameter of 3-4 inches when the tree becomes diseased will usually hang on the tree until they mature or until their supporting leaves fall; the latter usually occurs before the nuts have time to mature. Young racemes are often dead when the sheath opens, being invaded and rotted at the base.

The leaves of infected trees sometimes have rows of dark brown spots extending across the pinnae. These spots are due to an infection which occurred in the bud where the pinnae were pressed together. We have not established any connection between these spots and the disease. In the majority of infected trees they are not present. Occasionally they are found on the older leaves, and the young leaves are perfectly green and healthy. The spots are not a characteristic symptom of bud-rot.

The bud-rot in Porto Rico resembles the descriptions of the bud-rot found in Jamaica, India and the Philippine Islands. It is not the Cuban bud-rot.

The disease apparently spreads most rapidly during the rainy season.

It is not purposed to go into a discussion of the cause of the bud-rot at this time. The disease is infectious and the causal organism may be carried from diseased to healthy palms by the wind, and by birds and insects. The butyrous odor given off

by the decaying buds is especially attractive to insects, and in the more advanced stages the rotted portion literally swarms with larvae. The infection appears to occur on the youngest leaf and grow down into the bud or near the base of a young tender leaf sheath, growing through the intervening sheaths until it reaches the growing point.

It is improbable that dissemination occurs from a palm in the earliest visible stage of bud-rot, because the causal organism is closely surrounded and enclosed by the leaf bases and sheaths. However, when the young leaf falls out the infectious material is exposed to the wind, birds, insects, etc. A diseased tree may remain a source of infection for several months, or until the soft tissues are completely rotted, dried up and carried or blown away.

Control measures must be directed toward the prompt removal and destruction of infected trees. The coconut cannot produce a new bud and a tree having the characteristic dead emerging leaf invariably dies. Such a tree should be felled at once. The bud must be destroyed, for it is almost as great a hazard on the ground as in the air. The method we have found most practicable is to fell all infected trees, cut off the tops about 1 to 2 feet below the leaves, drag the tops into a pile, saturate them with kerosene and burn them. The burning must be done carefully and conscientiously, as the young coconut tissues contain much moisture and are sometimes difficult to burn.

Every grove should be inspected frequently to prevent the spread of the disease from an occasional infection. It is not known to what distances infection may be carried by the wind. There seems no reasonable limit to the distance the disease may be carried by animals.

Jamaica has a law requiring the destruction of diseased buds by fire. The West India Bulletin states, "Starting in 1918 a vigorous campaign was prosecuted under adequate supervision throughout the eastern districts. It is reasonable to conclude that the low incidence of disease now (December 1919) is due mainly to this systematic work".

In view of the above facts the control of the disease will be most efficient when the coconut grove owners act in concert and remove all the infected trees from a district. A group of diseased trees is the concern not only of its owner but of owners of all nearby groves. The disease can and should be prevented from spreading to all the coconut growing sections of the Island.

The Insular Department of Agriculture is anxious to give all possible assistance to grove owners in combating the bud-rot. This Station is also ready to cooperate and will investigate any suspected cases of bud-rot.

SUMMARY.

Coconut bud-rot has appeared in Porto Rico and is spreading along the western coast.

It is easily recognized by the dead, yellow youngest leaf, which becomes broken over and finally falls; by the fringe of horizontal leaves surrounding the apex of the trunk and the absence of the central column; by the soft, rotted, malodorous bud.

The disease is transmitted by the dissemination of the causal organism from diseased to healthy trees, by the wind, birds, and insects.

Control measures are the destruction of infected trees as early as possible after the first symptoms appear, and frequent grove inspection to prevent reinfection.

Cooperation among grove owners is of utmost importance in making a single eradication campaign of lasting value.

